Emerging Technologies and Trends Impact Radar: 2022

Research Excerpt

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Initiatives: Emerging Technologies and Trends Impact on Products and Services

The technologies with the most potential to disrupt a broad cross section of markets show four themes: the smart world, the productivity revolution, ubiquitous and transparent security, and critical enablers. Product leaders must explore these technologies now to capitalize on market opportunities.

Overview

Key Findings

- Smart spaces and multimodal UI will revolutionize how users and workers interact with the world around them by adding multiple dimensions of contextual awareness to create natural, seamless, automated interactions with the world.
- Synthetic data and self-supervised learning will rapidly accelerate AI capabilities and unlock unprecedented levels of business efficiency, effectiveness and growth through the application of advanced AI techniques.
- Protecting the privacy of individuals, organizations and data will require robust and user-friendly technologies, such as passwordless authentication and homomorphic encryption.
- Graph technologies act as a glue and multiplier by covering connections between all data and delivering value in areas such as healthcare management, clinical research and healthcare supply chain.

Recommendations

For product leaders assessing the impact of emerging technologies and trends on products and services:

- Invest in user experience technologies, such as advanced virtual assistants and multimodal UI that improve productivity and provide more natural and dynamic interactions.
- Unlock the potential of AI tools, such as AI-augmented software engineering (AIASE), to deliver products with clear value to customers, faster, at lower cost, and with higher quality by automating high-frequency software engineering tasks. Apply AIASE to use cases such as automated peer review.
- Use homomorphic encryption to ensure data privacy while delivering compliant, safe operation and ethical application of user-experience-friendly security technologies, such as passwordless authentication.
- Add business value to your solution by using emerging technologies and trends such as graph technologies to store, manipulate and analyze relationships between entities.

Analysis

Overview of the Emerging Technologies and Trends Impact Radar

The Emerging Technologies and Trends Impact Radar highlights the technologies and trends that have the most potential to disrupt a broad cross section of markets. In this document, we have identified 20 of the highest-impact emerging technologies and trends (see Figure 1) that are critical for product leaders to evaluate as part of their competitive strategy, summarized by four key themes.

This radar summarizes (but is not limited to) the technologies and trends found in this year's Impact Radars and most closely aligned with (or most influential to) these themes.

The Smart World

By 2026, key rapidly advancing technologies, such as digital twin, Internet of Things (IoT) platforms, smart spaces, multimodal UI and advanced virtual assistants, will transform how people interpret and interact with the world.

Digital twin represents a design pattern but also one way the physical world and the accompanying processes involved are being digitized. IoT platforms underscore the importance of captured data to drive business decision improvement. They further underscore the value of sensor and sensing data for contextual relevance and awareness — two aspects that are essential to expanding and improving people's ability to interact with the world.

Smart spaces represent the epitome of contextually aware environments and the convergence of multiple, independently evolving trends to create highly personalized experiences — for example, through the lens of augmented or virtual reality experiences. Multimodal UI and advanced virtual assistants (VAs) are changing the way customers interact with IoT devices and engage with digital platforms, improving employee productivity and leading to improved business productivity and cost optimization. (See Emerging Technologies: Top Use Cases for Advanced Virtual Assistants in Enterprise Operations.) In total, these technologies will change the way people experience the world.

The growing intersection of the physical and digital world will require flexibility of interaction modalities. New experiences will require a combination of interfaces, depending on the person, device, application and context. Multimodal UI will be required to facilitate the interactions between humans and machines.

The Productivity Revolution

Within the next decade, AI and computing will see a second revolution, bringing breakthroughs in capability and speed. These breakthroughs will be a force multiplier for business and technology by unlocking further potential for meaningful innovation and making foundational artificial intelligence (AI) technologies more useful. (See Emerging Technologies and Trends Impact Radar: Artificial Intelligence, 2021.)

Generative AI will add a new dimension to productivity by producing totally novel media content (including text, image, video and audio), synthetic data and models of physical objects based on the original data. For example, generative models can be used in drug discovery or for the inverse design of materials having specific properties.

Synthetic data will help train AI models where sufficient data is not available. There are already numerous areas that are taking advantage of synthetic data, including automotive, healthcare, finance, computer vision, data monetization, external analytics support, platform evaluation and the development of test data. Furthermore, synthetic data that is produced using generative AI techniques supports the accuracy and speed of AI delivery.

Self-supervised learning will take us to the next phase of AI by enabling data labels to be created from the data itself, without having to rely on external (human) supervisors that provide labels or feedback. This will overcome one of the fundamental problems with current AI — the need for large amounts of data and the time and energy required to to label the data.

Ubiquitous and Transparent Security

As humans and technology become interwoven, security will play an increasingly crucial role in addressing threats. Access to a growing suite of devices, systems, applications and accounts will partly be secured by passwords. But the number and complexity of passwords required is already causing poor user experience (UX) and, in turn, potentially heightening security risks as users circumvent password best practices. Passwordless authentication is meant to minimize the use of passwords and improve UX while removing the known vulnerabilities associated with centrally stored passwords.

Furthermore, the co-evolution of the physical and digital world will be determined by the systems of values and moral principles for the conduct of electronic interactions among people, organizations and things (digital ethics). Technology such as homomorphic encryption will be an important way to ensure the protection and privacy of data between third-party data processing and analytics providers. The importance of security technologies such as homomorphic encryption will grow as privacy and data protection mandates continue to expand globally.

Critical Enablers

Critical technology enablers will disrupt markets where they are applied by reshaping business practices, processes, methods, models and functions. Organizations require products that improve business outcomes that will involve capabilities across several products. Collaborative ecosystem product development (CEPD) is one way product leaders can deliver on this need — by partnering with several, sometimes competing, vendors to develop new solutions. Further efficiency and flexibility will be enabled by the next era of composable enterprise — AI-generated composite applications. This will enable dynamic personalized experiences seamlessly across channels — without requiring a human application developer.

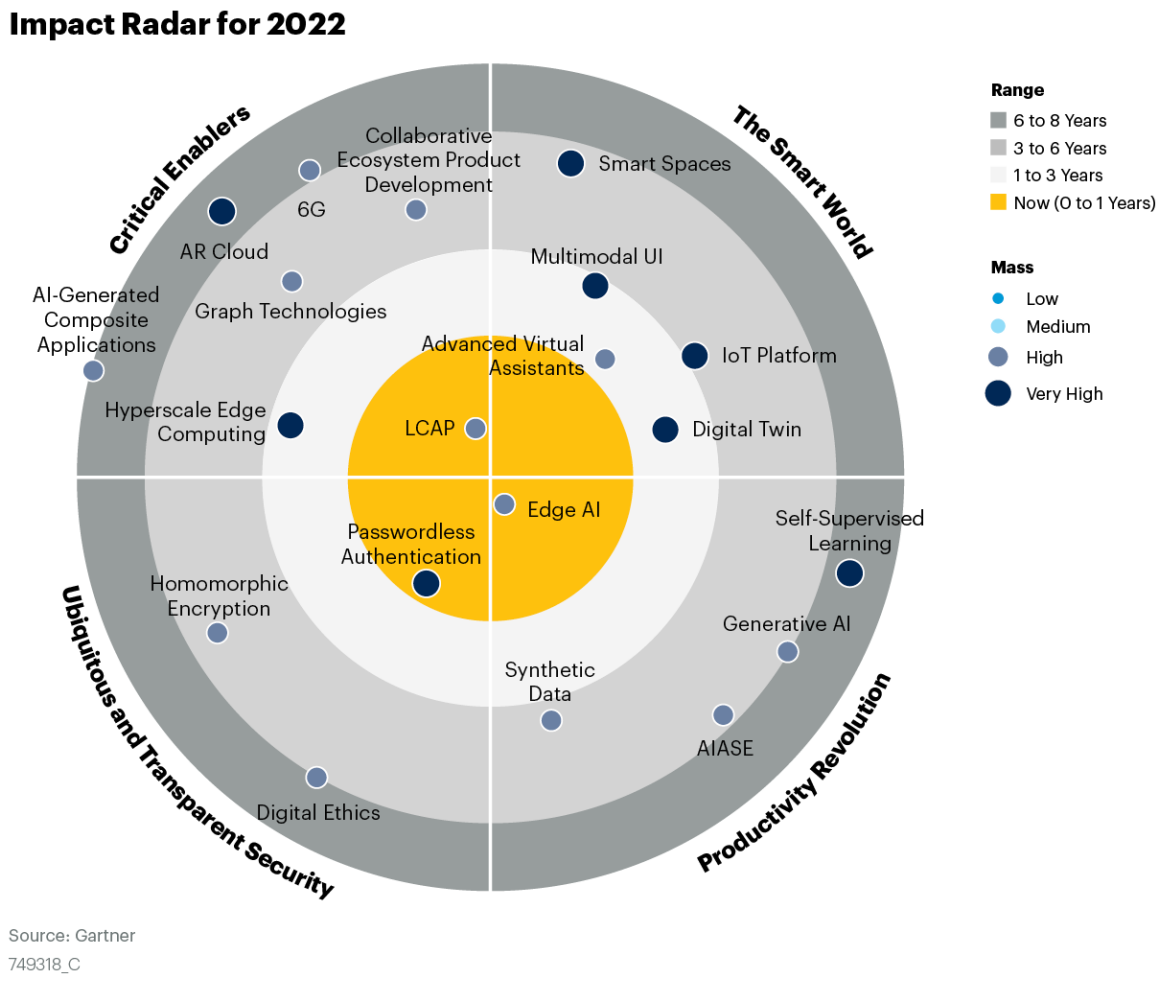
The demands of spatial computing, novel interconnected network paradigms and real-time analysis of interface and experiences will require a shift from centralized cloud computing models to a distributed model. Hyperscale edge computing (HEC) is one example in which data storage and processing are placed close to the things or people that produce and/or consume that information.

Understanding the dynamics between and within the physical and digital world will uncover new opportunities and yield additional business value. Graph technologies will help make sense of relationships between entities such as organizations, people or transactions. This will allow organizations to store, manipulate and analyze widely varied perspectives.

The Impact Radar

Figure 1 shows the highest-impact emerging technologies and trends based on time to adoption.

Figure 1: Impact Radar for 2022



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The objective of this research is to guide product leaders on how emerging technologies and trends are evolving and impacting areas of interest. Providers can leverage this knowledge to determine which technologies or trends are most important to the success of their business and when it makes sense to advance their products and services by investing in them.

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